WHAT IS CLAIMED IS:

1. A magnetic read/write head having a protective coating comprising:
a highly tetrahedral amorphous carbon.

2. A magnetic recording media for use with a read/write head, the media comprising:
a substrate;
a magnetic layer disposed over the substrate; and
a protective layer over the magnetic layer, the protective layer comprising a highly tetrahedral amorphous carbon;
wherein the protective layer has a thickness of less than about 50 Å and a hardness of over about 80 GPa;
wherein the protective coating is adapted for use during continuous contact of the media with the read/write head; and
wherein the media has an areal density of over 1 gigabyte per square inch.

3. A method for depositing a protective coating comprising a continuous highly tetrahedral amorphous carbon on a substrate, the method comprising:
ionizing a source material so as to form a plasma containing ions which comprise carbon; and
energizing the ions to form a stream from the plasma toward the substrate so that carbon from the ions is deposited on the substrate, wherein the ions impact with an energy which promotes formation of sp^3 carbon-carbon bonds.

4. A method as in claim 3, wherein the carbon is deposited on the substrate at a rate higher than about 10 Å per second.

5. A method as in claim 3, wherein the source material comprises acetylene.

6. A method as in claim 3, wherein the substrate comprises at least one of magnetic recording media, glass, optics, machine tools, and integrated circuits.